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that the work required to move a particle of unit mass from the point $(x,\ y,\ z)$ to an infinite distance is $m[(x-a)^2+(y-\beta)^2+(z-c)^2]^{-\frac{1}{2}}$. Prove also that

$$\left(\frac{d^2}{dx^2}+\frac{d^2}{dy^2}+\frac{d^2}{dz^2}\right)\{m[(x-a)^2+(y-b)^2+(z-c)^2]^{-\frac{1}{2}}\}=0,$$

except when $x=a,\ y=b,\ z=c$.

Solution by S. A. COREY, Hiteman, Iowa.

Let $r=[(x-a)^2+(y-b)^2+(z-c)^2]^{-\frac{1}{2}}$=distance from point $(a,\ b,\ c)$ to point $(x,\ y,\ z)$. The gravitating force exerted between the two particles will then be m/r^2. As the gravitating force is always directed along r, the work required to move the unit mass from the point $(x,\ y,\ z)$ to an adjacent point $(x+dx, y+dy, z+dz)$ by any path would be $(m/{}^2)dr$. The total work done as r is increased from r to infinity would be $m\int_r^\infty\frac{dr}{r^2}$, or m/r, as requirod.

$$\text{As } m\frac{d^2}{dx^2}\cdot\frac{1}{r}=m\,\frac{3\,(x-a)^2-r^2}{r^5},\quad m\frac{d^2}{dy^2}\cdot\frac{1}{r}=m\,\frac{3\,(y-b)^2-r^2}{r^5},$$

$$m\frac{d^2}{dz^2}\cdot\frac{1}{r}=m\,\frac{3\,(z-c)^2-r^2}{r^5},\quad m\left(\frac{d^2}{dx^2}+\frac{d^2}{dy^2}+\frac{d^2}{dz^2}\right)\cdot\frac{1}{r}=0,$$

for all values of r except $r=0$, *i. e.*, except when $x=y.\ y=b,\ z=c$.

Also solved by G. W. Greenwood, B.A. (Oxon); M. E. Graber, A.B.; W. W. Landis; and Proposer.

GROUP THEORY.*

1. [Miscellaneous No. 144, in January, 1904, p. 21.] Proposed by L. E. DICKSON, Ph. D., The University of Chicago.

Burnside, in his systematic search for all simple groups of orders from 661 to 1092 (*Proc. Lond. Math. Soc.*, 1895, pp. 333-338) overlooked the orders $2^3.3^2.11$ and $1008=2^4.3^2.7$. The former is immediately excluded. Discuss the latter.

Solution by W. BURNSIDE, The Croft, Bromley Road, Catford, England.

With regard to the second [order 1008], it is clear that the supposition that the group is simple, with 8 subgroups of order 7, leads to the contradiction of a group of degree 8 with operations of order 21. In the only other case, viz., 36 subgroups of order 7, each self-conjugate in a subgroup of order 28, the group must be expressible as a *primitive* group of degree 36, in which the subgroup of order 28, which leaves one symbol unchanged, has a self-conjugate operation of order 2, which leads to an obvious contradiction.

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*See page 100.